

Nurturing Innovation Capabilities within the IT Function: Implications for Human Resources Management, Training and Education

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Abstract Harnessing the creative abilities of information technology (IT) professionals is a critical factor in exploiting the competitive advantages of IT within organisations. This paper examines some of the constraints on innovation within IT departments and divisions and suggests a range of solutions which involve radical changes within the departments/divisions and the wider organisational context. An agenda for research is proposed which highlights the need not only to examine the way different factors interact to influence innovativeness within the IT function but the role of educational institutions in nurturing the innovation capabilities of Computing/IT graduates.

Key words IT function, innovation, training, education

1 Introduction

The survival and growth of business enterprises increasingly depends on their ability to exploit new developments in information and communication technologies (ICT) to improve internal effectiveness and promote product/service innovation [1,2]. Although ideas for innovatory use of ICT can, in theory, come from any part of an organisation, it could be argued that the IS/IT function should be a key source of ICT innovation. There are certainly many outstanding examples of IS/IT departments that have developed ideas which have led to breakthroughs in product/service delivery and improved operational effectiveness. At BP, the company's Digital and Communications Technology Office, under the direction of Ken Douglas recently implemented a sensory networks technology programme that not only transformed business processes but the nature of the work itself. At BT, the IT Division, BT Exact, under Chief Information Officer, Al Noor Ramji, has won praise for using IT to improve operational efficiencies, reducing project cycles from 18 months to three, raising IT productivity by 17%, and generating savings of over £2m. The improvements are helping the company move closer to its goal of becoming a world class IT service provider [3]

These success stories are offset by the continuing high failure rate of IT projects. Research by PriceWaterhouseCoopers, for example, indicates that 50% of IT projects are late or over budget and 25% are written off [4]. The problems IS/IT departments experience managing IS/IT project implementations highlight some of the constraints on IT innovation within organisations. Studies suggest that the complexity of the software development process, the rapid pace of technological change, lack of adequate resources, poor project management skills, the large-scale and ambitious scope of many projects, lack of senior management and user involvement, shortages of IT skills and use of the wrong software tools or hardware platform may all contribute to project failure [5,6,7,8,9,10] Senior managers in organisations that have problems with IT project implementations may, understandably, be wary of considering innovatory ideas from the IS/IT department. For their part, managers of IS/IT departments that are not perceived as being engines of innovation may make little effort to innovate, thus helping to create a self-fulfilling prophecy. Since IS/IT is both a source and enabler of innovation, it is clearly important to determine what can be done to help IS/IT departments develop and promote innovatory ideas and get them accepted within their organisation. This paper examines some of contextual factors that influence the ability of IS/IT departments to facilitate innovation and the role of Human Resource Management, training and education in enhancing innovation within the IT function. The section below places the discussion in context by looking at some of the changes in the use of IT and the roles of IT professionals that have increased the importance of innovation within IT departments/divisions.

2 Literature Review

The potential for IS/IT to transform business has long been recognised but began to attract serious academic interest in the 1980's with the widespread adoption in business of PC's, networked technologies and user-friendly programming languages. These innovations led to a massive growth in

demand for computing skills but the problems of aligning IT to business goals highlighted the need for computer staff with greater awareness of the business applications of IT. At the end of the 1980's the British Computer Society (BCS) in the UK argued that the solution to the problem was for companies to develop a new breed of 'hybrid managers' who possessed knowledge of IT and the business [11, 12, 13]. This new breed would help organisations use IT to transform business processes and develop new IT based products and services.

Since then the idea that organisations need business-literate IT professionals has gained increased ground. Institutions of Higher Education have responded by introducing Business Information Technology undergraduate and postgraduate programmes and organisations have implemented training programmes designed to equip their IT staff and business managers with the broad range of skills needed to harness the innovatory potential of ICT [14,15]. There are also various awards that recognise excellent performance and innovation amongst IT professionals. Every year, Computing magazine offers prizes for the most innovatory project of the year, most 'green' project of the year, IT leader of the year, IT department of the year, etc [16]. Notwithstanding all these changes, there remains a yawning gap between IT and the business with research showing that many CIO's struggle to gain recognition and the support of senior management [17]. A study by Bursen-Marsteller (2005) of more than 3,000 businesses, including Fortune 500 companies, found that only 5% had a Chief Information Officer on the Board [18].

Some of the problem undoubtedly arises, not from the IT function, but the organisation itself. A study by Anand *et al* (2006) of the adoption and diffusion of IT innovations within organisations which analysed 48 empirical studies of individual and 51 organisational studies of IT adoptions published between 1992 and 2003 found that organisational and innovation characteristics were good predictors of IT adoption at both individual and organisational level [19]. Companies with rigid organisational structures, bureaucratic cultures and top-down autocratic management struggle to create the conditions that encourage IT innovation or lead to its rapid assimilation. The idea that organisations may unconsciously create barriers to IT innovation is also borne out by research on disruptive technologies, i.e. products or systems that create entirely new markets. Gordon (2006) suggests that the reason leading corporations often fail to discern the potential of disruptive technologies may lie in 'managers' mental models' which prevent them perceiving the possibilities of new technologies [20]. Large bureaucratic organisations inadvertently reinforce these mental models and in so doing inhibit knowledge generation, knowledge sharing and deep learning.. This may help to explain the finding by Jones and Austin (2002) that larger companies often find it harder to innovate than smaller companies [21].

One of managers' mental models may, of course be that the IT function is not a good source of innovation. A key finding of the research by Anand *et al* (2006) was the adoption of IT innovation within companies depends critically on top management support and the professionalism of the IS unit [19]. Unfortunately, the difficulties IT staff face getting board level recognition means that senior staff do not obtain as much exposure to technology issues as they would if they had a Chief Information or Chief Technology Officer on the top team. Although it is difficult to make causal inferences, research suggests that those businesses that do have CIO's on their board, outperform their competitors, with profits of 6.4% above the industry average [18]. Appointing a CIO or CTO is clearly one way of boosting innovation in IT and encouraging its adoption within the organisation but this is not likely to happen unless corporate mindsets change which is difficult to effect. Hrycyk (2007) director of IT at NYK Logistics argues strongly that it is up to the IT function to prove its worth by first improving operational effectiveness and building credibility [22]. Only then is it possible to progress 'IT-driven business innovation'. While this is undoubtedly true, senior manager actions create the conditions that make this possible. The next section considers what practical steps organisations can, and in some cases have taken, to enhance innovation within the IT function.

3 Industry Solutions

The leadership of the IT function is critical in determining operational effectiveness and process innovation [23]. The difficulty many organisations face, of course, is finding leaders with the depth of technical expertise and breadth of business knowledge to identify opportunities for using IT to enhance performance or transform existing products/processes/services. Those who possess the requisite technical knowledge may have little interest in business issues and organisational politics, preferring to devote their energies to developing new systems. Senior management and HR may be content to leave such experts in IT, and not rotate them to other functions, because their technical skills are in such short

supply and so valuable to the organisation. Indeed, many organisations have instituted dual career ladders so that those with high level technical skills are not tempted into management because the pay and conditions are better. Surely this thinking is a little old-fashioned. All IS professionals need to understand the context in which IT is applied. Truch (2005) visiting professor at Lancaster University Business School and director of the Centre for Innovation Through IT, calls for a ‘broadening of the IT professional’s role ... to include working closely with managers across the organisation and contributing to their strategic thinking and decision-making’ [24]. Perhaps part of the solution is to make innovation, the ability to find value added technology solutions, a criterion of promotion and rewards for all IT staff, thus giving them an incentive to demonstrate innovatory leadership at all levels of the IT organisation.

If IT staff are to be rewarded for innovation, the organisation has a duty to foster the conditions that promote creativity. One of doing this is through training. Brandel (2007) describes an IS Innovation Programme at US company Partners Healthcare System Inc which involves employees in the IS department enrolling on a 16 week course where they work in groups of four on a complex business problem. Participants are mentored by a business director and a peer mentor who has attended the programme and work collaboratively with staff in other departments to solve the business problem. They also take ‘off-site’ experience trips to hear guest speakers [15]. The Programme is extremely time-consuming but has a number of clear virtues in terms of nurturing innovation, notably: (1) Participants have a real problem to work on, and are thus likely to take the task seriously; (2) working in groups creates the conditions for social learning and knowledge exchange; (3) the appointment of a high level mentor is likely to boost self-confidence and produce some cross-fertilisation of ideas; (4) working collaboratively with staff inside the organisation may facilitate skills exchange, generate new ideas and raise the profile of IS; (5) taking off site visits exposes team members to other influences and reinforces the importance of the task.

Participating in a course can stimulate creative thinking but changes in the work environment may have a more enduring effect. They also affect everyone. One obvious change is in office layout – creating social spaces. If staff are encouraged to chat informally in comfortable areas away from their desks there is a much greater likelihood they will exchange the ‘tacit’ knowledge which Nonaka (1991) sees as the key to generating the ‘knowledge creating’ company [25]. Over ten years ago, the Information Services Division of American Greetings Corp. changed work space arrangements so that IS staff had ‘serendipitous encounters’ with staff in other parts of the business, thereby creating opportunities for social learning and, possibly, some creative dialogue [26] Creating social spaces helps communicate the message that social interaction is viewed by senior management as potentially productive.

A final change that may stimulate innovation is perhaps the most dramatic: altering the work that IS professionals carry out. With the trend towards outsourcing, it is likely that more and more IS professionals will find themselves managing the interface with providers, maintaining IT infrastructure and working in multi-functional teams with business users. If job descriptions and role specifications reflect these changes and use the language of creativity and of business to describe what is expected, IS professionals may be more likely to see themselves as IS business professionals with a responsibility to identify opportunities for using IT creatively to add business value.

4 Education Solutions

It could be argued that the long-term solution to fostering innovation within IT lies not with industry but the school system and Higher Education. If pupils/students are taught to think creatively they will develop more innovative applications. This raises the age-old controversy of whether innovation and creativity can ever really be taught. The view that is increasingly gaining ground is summed up in a recent UK Government report which maintains that “all children and young people can be creative and should have access to creative experience” [27]. In other words everyone has some creative abilities but they need to be nurtured. According to this view, pupils who are taught computing in schools have the capacity to use them innovatively, and will do so, provided they are taught innovatively in an environment that encourages experimentation, tolerates failure and rewards interesting ideas. The same argument also applies to Higher Education and has important implications for the design and delivery of curricula in the Computing/IS area. It suggests that course content should address innovation issues and that teaching and learning methods should seek to harness the creativity of

students or, at least, create the conditions where innovation is possible.

To what extent undergraduate and postgraduate Computing/IS degrees are incorporating innovation themes is not clear. In the UK, the subject benchmark statements for undergraduate Computing degrees highlight the need to use a range of appropriate teaching and learning approaches but students' capacity to innovate is not explicitly mentioned [28]. Signs that institutions are beginning to recognise the need to introduce innovation or, at least increase business awareness, can be found in the plethora of courses that combine management and IT at undergraduate and postgraduate levels. The Business Subject Benchmark statements identify the capabilities of "creativity and originality" as criteria in distinguishing Honours level graduates so it is possible students on combined IT and business honours programmes would gain exposure to innovation processes [29]. What this might be, however, is vague and likely to be interpreted differently depending on the institution.

It was to address the need for a more 'innovation' led curriculum that the author of the paper and a colleague devised a postgraduate IS module on IT Intrapreneurship. The unit is of interest because it focuses specifically on innovation issues. The aims are to: develop an in-depth understanding of the processes involved in identifying and analysing opportunities for the application of ICT to strategic business problems; foster a critical appreciation of the complex processes involved in the adoption and implementation of new ICT systems and to develop the ability to evaluate the difficulties involved in assessing the impact of new technologies on organisational functioning and the techniques available to facilitate such analysis. In devising the unit, there was much discussion about how to assess IT Intrapreneurship since the proof would essentially lie in the ability to innovate. Herein lay the difficulty – many full-time students would not be in a position to identify and champion a possible innovation. The solution was to require students to conduct a case study analysis of a successful innovation at an organisation of their choice. In this way they would gain exposure to a real world example of IT innovation success or failure and develop insights into concepts and theories that may help them later in their career when they are faced with the task of innovating with IT.

5 Conclusion

This paper has examined some of the human resources implications of fostering innovation capabilities within the IT function of organisations. It has been suggested that the IT function has a key role to play in helping organisations become more innovative but sometimes fails to do so because of poor internal management and/or an unreceptive organisational context. Various solutions to the problem have been considered, including appointing inspirational leaders, offering rewards at all levels of the IT function for innovations that support organisational goals, introducing innovation training programmes, changing the physical working environment for IS professionals so they have more opportunities to interact with one another and business users, changing IS professionals' roles to promote more creativity and reforming the Computing/IS curriculum in Higher Education institutions so that students are taught creativity and learn about innovation processes.

Research is now needed which examines how effective these solutions are in promoting innovation capabilities. Studies of the ways in which different variables interact to stimulate innovation would be particularly useful. Research on the impact of inspirational leaders, for example, could examine how effective this is on its own or whether better results are obtained when transformational leadership is combined with compensation systems that reward innovativeness. Similarly studies of the long-term impact of innovation training programmes need to consider the impact of other changes in the IS environment, including changes in the roles of staff and the social environment in which they operate. Qualitative and quantitative research is needed. There are few detailed case studies of the human resource implications of developing innovation capabilities in IS. Such studies would provide a much deeper insight into the factors that influence innovative behaviour and how the organisational context shapes the outcome of initiatives to nurture innovation. Quantitative studies would be extremely useful in developing policy guidelines for use by HR practitioners and senior managers who want their IT departments to make a more creative input to business processes.

The contribution of educational programmes to developing innovative capabilities is an extremely important area that requires much more detailed attention. Children are now taught to use computers in schools in most countries that have the resources but we know relatively little about how creatively this is approached, whether the tasks given pupils stimulate creativity and, indeed, whether process and

outputs are perceived by pupils as being creative and satisfying. It would be useful to have answers to these questions and also whether early experience of use of computers influences choice of educational course and career later in life. There is some concern that applicants may be put off courses and jobs in computing because they are NOT perceived as exciting or creative [30]. Studies of the use of creativity to teach Computing/IS at university would also provide valuable insights into whether the approach used stimulates innovation. Research in this area also needs to explore the interaction of personal characteristics in the learning process and the role of environmental factors in influencing innovation capabilities. The outcomes of such research would help to inform not just policy in the delivery of Computing/IS courses but also help to ensure that industry has a supply of graduates who, as Truch (2005), puts it, “can walk the organisational boundaries and influence the way IT systems are exploited in every part of the business [24].

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